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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/682,411	08/30/2001	Zheng Tang	45283.4	7773
22828	7590	12/05/2003	EXAMINER	
EDWARD YOO C/O BENNETT JONES 1000 ATCO CENTRE 10035 - 105 STREET EDMONTON, ALBERTA, AB T5J3T2 CANADA			CREPEAU, JONATHAN	
			ART UNIT	PAPER NUMBER
			1746	

DATE MAILED: 12/05/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

# Office Action Summary

Application No.

09/682,411

Applicant(s)

TANG ET AL.

Examiner

Jonathan S. Crepeau

Art Unit

1746

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☒ Responsive to communication(s) filed on 30 August 2001.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 1-11 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-11 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

## Priority under 35 U.S.C. §§ 119 and 120

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
a) ☐ All b) ☐ Some \* c) ☐ None of:  
1. ☐ Certified copies of the priority documents have been received.  
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.  
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).  
\* See the attached detailed Office action for a list of the certified copies not received.
- 13) ☒ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application) since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.  
a) ☐ The translation of the foreign language provisional application has been received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121 since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

## Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_\_
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) \_\_\_\_\_ 6) ☐ Other: \_\_\_\_\_

## **DETAILED ACTION**

### ***Specification***

1. The abstract of the disclosure is objected to because in line 1, "olid" should be "solid." Correction is required. See MPEP § 608.01(b).

### ***Claim Objections***

2. Claims 13 and 14 are objected to under 37 CFR 1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous claim. Applicant is required to cancel the claim(s), or amend the claim(s) to place the claim(s) in proper dependent form, or rewrite the claim(s) in independent form. Claims 13 and 14 are each directed to "The method of claim 11," but claim 11 defines a solid oxide fuel cell. It is suggested "claim 11" be changed to --claim 12--.

### ***Claim Rejections - 35 USC § 102***

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

4. Claims 1 and 2 are rejected under 35 U.S.C. 102(b) as being anticipated by JP 2-87472. Regarding claim 1, the reference is directed to a solid oxide fuel cell comprising an electrode layer (2, 3) applied to an electrolyte layer (1). The electrode layer comprises discrete elements separated by substantially uniform gaps (see abstract; Fig. 5). Regarding claim 2, the discrete elements may be polygonal (square) in shape (see Fig. 6).

Thus, the instant claims are anticipated.

5. Claims 1-4, 12, and 14 are rejected under 35 U.S.C. 102(e) as being anticipated by Ruhl et al (U.S. Patent 6,361,892). Regarding claims 1 and 12, the reference is directed to a solid oxide fuel cell comprising an electrode layer applied to an electrolyte layer, which electrode layer comprises discrete elements separated by substantially uniform gaps (see col. 8, lines 39-42; Figs. 2 and 3). Regarding claim 2-4 and 14, the reference teaches that the elements can be made of "ovals, squares, rectangles, and other regular or irregular polygonal shapes." This disclosure is anticipatory of a hexagonal or regular hexagonal shape since these shapes can be immediately envisaged from the disclosure. Regarding claim 12, the electrode layer may be made by screen printing followed by sintering (see col. 6, line 29; col. 8, line 31).

Thus, the instant claims are anticipated.

*Claim Rejections - 35 USC § 103*

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. Claims 8-11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ruhl et al.

The reference is applied to claims 1-4, 12, and 14 for the reasons stated above. However, the reference does not expressly teach that the gaps between elements take up less than about 5%, 2%, or 1% of the surface area of the electrode, as recited in claims 8-11.

However, the invention as a whole would have been obvious to one of ordinary skill in the art at the time the invention was made because the artisan would be motivated to use small gaps (channel widths) between the elements of the electrode of Ruhl et al. In column 7, line 16, Ruhl et al. teach the following:

The preferred pattern is designed with consideration to the column spacing and the contact-area percentage. Column spacing may be relatively wide to help minimize the cell pressure drop. Pressure is controlled by the size of the column (diameter) and the number of columns per square centimeter. The column diameter and the contact-area percentage may be selected by a compromise between minimizing electrical resistance, achieving good reacting gas distribution to and from the active electrode sites, achieving the target pressure drop within a minimum pattern thickness, and fabrication limitations, if any.

Thus, the references recognizes that channel width is a parameter that affects pressure drop, electrical resistance, and contact area, among other characteristics. It has been held that the discovery of an optimum value of a result effective variable in a known process is ordinarily within the skill of the art. *In re Boesch*, 205 USPQ 215 (CCPA 1980). In this case, there would

be sufficient motivation to make the gaps as thin as possible in the interest of increasing contact area and decreasing electrical resistance. Accordingly, Applicants' claimed ranges are not considered to distinguish over the reference.

8. Claims 5 and 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ruhl et al. as applied to claims 1-4, 12, and 14 above, and further in view of Carolan et al (U.S. Patent 5,750,279).

Ruhl et al. do not expressly teach that a contact paste is coated on the electrode, as recited in claims 5 and 13.

Carolan et al. is directed to a solid oxide fuel cell. In column 6, lines 23-28, the reference teaches a conductive paste located between the electrode and interconnector.

Therefore, the invention as a whole would have been obvious to one of ordinary skill in the art at the time the invention was made because the artisan would be motivated to use the conductive paste of Carolan et al. between the electrode and interconnector (separator) of Ruhl et al. In column 13, line 41, the reference teaches that "[t]he conductive material 340, 342 serves to direct electrons from the anode layer 326 to the interconnect layer 316, and from the interconnect layer 316 to the cathode layer 332." Thus, the artisan would be motivated to use the conductive paste of Carolan et al. between the electrode and interconnector of Ruhl et al. in hopes of improving electrical conductivity (i.e., decreasing electrical resistance) between the two.

9. Claims 6 and 7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ruhl et al. in view of Carolan et al. as applied to claims 5 and 13 above, and further in view of Singh et al (U.S. Patent 5,516,597).

Carolan et al. further teach that the conductive material may be formed from an electrode material (see col. 6, line 26). However, Carolan et al. do not expressly teach that the conductive material is lanthanum cobaltate, as recited in claim 6.

Singh et al. is directed to a solid oxide fuel cell. In column 6, line 52, Singh et al. teach the following:

niques. The air electrode is typically comprised of doped and undoped mixtures of metal oxides such as  $\text{LaMnO}_3$ ,  $\text{CaMnO}_3$ ,  $\text{LaNiO}_3$ ,  $\text{LaCoO}_3$ ,  $\text{LaCrO}_3$ , and other electrically conducting metal oxides. The dopants are typically Sr, Ca, Co, Ni, Fe, Sn, Ba, Ce or the like. The preferred air electrode

Therefore, the invention as a whole would have been obvious to one of ordinary skill in the art at the time the invention was made because the artisan would be motivated by Singh et al. to use lanthanum cobaltate as the conductive material of Carolan et al. Carolan et al. disclose that a suitable material is electrically conductive or an electrode material. In the passage above, Singh et al. identify  $\text{LaCoO}_3$  as being electrically conducting and an electrode material. The selection of a known material based on its suitability for its intended use has been held to be *prima facie* obvious (MPEP §2144.07). Thus, the artisan would have been sufficiently skilled to use  $\text{LaCoO}_3$  as the conductive material of Carolan et al.

*Conclusion*


10. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jonathan Crepeau whose telephone number is (703) 305-0051 (prior to December 17, 2003) or (571) 272-1299 (after December 17, 2003). The examiner can normally be reached Monday-Friday from 9:30 AM - 6:00 PM EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Randy Gulakowski, can be reached at (703) 308-4333. The phone number for the organization where this application or proceeding is assigned is (703) 305-5900. Additionally, documents may be faxed to (703) 872-9310 (for non-final communications) or (703) 872-9311 (for after-final communications).

Any inquiry of general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0661.

JSC

November 21, 2003

  
Jonathan Crepeau  
Patent Examiner  
Art Unit 1746